

Curriculum Vitae et Studiorum

Gianni A. Di Caro

1. Personal Data

- ◆ FAMILY, FIRST AND MIDDLE NAME: Di Caro, Gianni Andrea
- ◆ DATE AND PLACE OF BIRTH: 06/06/1965, Pescara (Italy)
- ◆ AFFILIATION: IDSIA - Galleria 1, 6928 Manno-Lugano (Switzerland)
- ◆ E-MAIL, WEB PAGE: gianni@idsia.ch, <http://www.idsia.ch/~gianni>
- ◆ MOBILE PHONE: +41 - 76 2203264
- ◆ TOTAL CITATIONS / H-INDEX / I10-INDEX: 9420 / 19 / 26 (Source: *Google Scholar*, <http://scholar.google.com>)

2. Education

- ◆ **Doctorate, with full honors - 11/2004**
 - INSTITUTION: Faculty of Applied Sciences, Université Libre de Bruxelles (ULB), Brussels, Belgium
 - DISSERTATION: *Ant Colony Optimization and its application to adaptive routing in telecommunication networks*
 - SUPERVISOR: Prof. M. Dorigo, FNRS & IRIDIA

- ◆ **Diplôme d'Études Approfondies (D.E.A.) (Master of Applied Sciences) - 05/2001**
 - INSTITUTION: Faculty of Applied Sciences, Université Libre de Bruxelles, Brussels, Belgium
 - DISSERTATION: *A society of ant-like agents for adaptive routing in networks*
 - SUPERVISOR: Prof. M. Dorigo, FNRS & IRIDIA

- ◆ **Laurea in Physics (Bachelor + Master of Science), Summa Cum Laude - 03/1992**
 - INSTITUTION: Faculty of Mathematical and Physical Sciences, University of Bologna, Bologna, Italy
 - DISSERTATION: *Implementation of a transputer-based system for real-time parallel data acquisition and action control in large particle physics detectors* (in Italian)
 - SUPERVISORS: Prof. R. Campanini and Dr. I. D'Antone, Department of Physics

3. Research Summary

My current research focuses on networking, bio-inspired computing, combinatorial optimization, swarm robotics, and reinforcement learning. My main goal is to exploit synergies among these fields to define computationally efficient and scalable solutions for the use and the adaptive control and coordination of large distributed systems, such as mobile ad hoc and sensor networks, electrical smart grids, transportation and manufacturing systems, and heterogeneous robotic swarms. Recent research include algorithms for adaptive routing in mobile ad hoc networks, use of networking information for distributed navigation and task allocation in heterogeneous robot swarms, optimal placement of mobile relay nodes in sensor networks, analysis of distributed optimization algorithms inspired by insect societies.

4. Academic and Research Positions

- ◆ **Senior Researcher [03/10 -]**
 - INSTITUTION: *Istituto "Dalle Molle" di Studi sull'Intelligenza Artificiale (IDSIA), Lugano (CH)*
 - ACTIVITIES: Research, teaching, and project writing in the domains of networking, combinatorial optimization, swarm robotics, and electrical grids

◆ **Post-Doctoral Researcher [10/06 - 03/10]**

INSTITUTION: *Istituto “Dalle Molle” di Studi sull’Intelligenza Artificiale (IDSIA), Lugano (CH)*

RESEARCH: Design and control of an innovative robotic system made of a swarm of heterogeneous autonomous robots acting and interacting in the full 3D space (EU-funded FET project *Swarmanoid*)

◆ **Post-Doctoral Researcher [05/03 - 09/06]**

INSTITUTION: *Istituto “Dalle Molle” di Studi sull’Intelligenza Artificiale (IDSIA), Lugano (CH)*

RESEARCH: Study of nature’s complex adaptive systems to design robust self-organizing systems for optimization and control tasks in peer-to-peer and mobile ad-hoc networks (EU-funded FET project *BISON*)

◆ **Marie Curie Postdoc Fellow [11/01 - 04/03]**

INSTITUTION: *IRIDIA, Université Libre de Bruxelles (ULB), Brussels (Belgium)*

RESEARCH: Application of artificial intelligence techniques for control and optimization in telecommunication networks, modeling of complex biological systems

◆ **Research Assistant for the Japan Science and Technology Corporation (JST) [01/01 - 09/01]**

INSTITUTION: *Advanced Telecommunications Research (ATR), Kyoto (Japan)*

RESEARCH: Brain modeling, reinforcement learning in partially observable environments, adaptive setting of meta-parameters for learning algorithms, multi-agent learning

◆ **Science and Technology in Japan Fellow [02/99 - 11/00]**

INSTITUTION: *HIP Labs, Advanced Telecommunications Research (ATR), Kyoto (Japan)*

RESEARCH: Distributed multi-agent algorithms for sequential decision making in non-Markovian situations, simulation and analysis of the human immune system

◆ **TMR - Marie Curie Fellow [08/96 - 02/99]**

INSTITUTION: *IRIDIA, Université Libre de Bruxelles (ULB), Brussels (Belgium)*

RESEARCH: Reinforcement learning algorithms for distributed and partially observable environments, applications to adaptive routing and load balancing in telecommunication networks

◆ **Research Assistant [03/96 - 06/96]**

INSTITUTION: *Department of Biomedical Sciences, University of Modena, Modena (Italy)*

RESEARCH: Modeling of biological and evolutionary systems, management of local computing resources

◆ **Research Consultant [12/95 - 02/96]**

INSTITUTION: *Istituto per la Ricerca Scientifica e Tecnologica (IRST), Trento (Italy)*

RESEARCH: Software integration and design of architectures for autonomous robot programming

◆ **Research Assistant [01/95 - 12/95]**

INSTITUTION: *Department of Mathematics, University of Trento, Trento (Italy)*

RESEARCH: Development of heuristic algorithms for combinatorial optimization, administration of unix systems and web sites, application of image processing and software engineering techniques

◆ **Post-Graduate Research Fellow [01/94 - 12/94]**

INSTITUTION: *IRST, Trento (Italy)*

RESEARCH: Implementation of a real-time stereoscopic vision system for autonomous robotic navigation using a parallel network of digital signal processors

◆ **Post-Graduate Research Fellow [07/93 - 12/93]**

INSTITUTION: *IRST, Trento (Italy)*

RESEARCH: Design and realization of a concurrent real-time software architecture for the management of the activities of a mobile autonomous robot equipped with multiple sensors

◆ **Graduate Research Assistant [04/92 - 07/93]**

INSTITUTION: *Department of Physics, University of Bologna, Bologna (Italy)*

RESEARCH: Parallel implementations of genetic algorithms for optimization, application of fuzzy logic and classical pattern recognition techniques to the discrimination of sub-atomic particle beams

5. Teaching and Lecturing

- ◆ **Graduate course:** “*Heuristics*”, Master in Intelligent Systems, University of Lugano (USI), Lugano, Switzerland, 1st Semester 2010-2011
- ◆ **Graduate course:** “*Heuristics Lab*”, Master in Intelligent Systems, University of Lugano (USI), Lugano, Switzerland, 1st Semester 2010-2011
- ◆ **Graduate course:** “*Heuristics*”, Master in Intelligent Systems, University of Lugano (USI), Lugano, Switzerland, 1st Semester 2009-2010
- ◆ **Graduate course:** “*Heuristics Lab*”, Master in Intelligent Systems, University of Lugano (USI), Lugano, Switzerland, 1st Semester 2009-2010
- ◆ **Undergraduate course:** “*Optimization and process evaluation*”, Bachelor in Engineering, University of Applied Science of Southern Switzerland (SUPSI), Lugano, Switzerland, 2nd Semester 2008-2009
- ◆ **Graduate course:** “*Heuristics Lab*”, Master in Intelligent Systems, University of Lugano (USI), Lugano, Switzerland, 1st Semester 2008-2009
- ◆ **Guest lectures** on “*Algorithms for network routing*”, Course of Heuristics, Master in Intelligent Systems, University of Lugano (USI), Lugano, Switzerland, December 2008
- ◆ **Guest lectures** on “*Swarm and collective intelligence*”, Course of Intelligent Systems, Master in Intelligent Systems, University of Lugano (USI), Lugano, Switzerland, December 2007-2009
- ◆ **Tutorial:** “*Ant Colony Optimization and its application to routing in telecommunication networks*”, at “*ANTS’06, 5th Int. Workshop on Ant Algorithms and Swarm Intelligence*”, Brussels, Belgium, September 4–7, 2006
- ◆ **Summer school classes** on “*Ant Colony Optimization: from innovative research to successful industrial applications*”, “*First Summer School on Aspects of Complexity*”, University of Bologna, Bertinoro, Italy, July 18–28, 2005
- ◆ **Short graduate course:** “*Swarm intelligence, nature’s way to system engineering*”, Department of Electronics, Computer Science and Automation, University of Girona, Spain, April 26–27, 2005.
- ◆ **Short post-graduate course:** “*Swarm intelligence and metaheuristics for combinatorial optimization*” for the *Intensive postgraduate course on “Spatial Intelligence*”, Department of Geoinformatics, Helsinki University of Technology (TKK), Finland, August 30 - September 3, 2004.

6. Fellowships & Awards

- ◆ **Best conference research paper** - Awarded to the paper “An algorithm combining linear programming and an ant system for the sequential ordering problem”, M. Mojana, R. Montemanni, G.A. Di Caro and L.M. Gambardella, *Second Annual International Conference on Advanced Topics in Artificial Intelligence (ATAI)*, Singapore, November 24–25, 2011

- ◆ **Best conference poster** - Awarded to the paper “Distributed motion planning for ground objects using a network of robotic ceiling cameras”, A. Reina, G.A. Di Caro, F. Ducatelle, L.M. Gambardella, *12th Conference Towards Autonomous Robotic Systems (TAROS)*, Sheffield, UK, August 31 – September 2, 2011
- ◆ **Best conference paper** - Awarded to the paper “AntHocNet: an Ant-Based Hybrid Routing Algorithm for Mobile Ad Hoc Networks”, G. Di Caro, F. Ducatelle and L.M. Gambardella, *8th International Conference on Parallel Problem Solving from Nature (PPSN VIII)*, Birmingham, UK, 18–22 September 2004
- ◆ **Marie Curie individual post-doc fellowship [11/01 - 04/03]** - Awarded by the scientific institutions of the European Union (EU) for the research project: *Ant and learning agents for adaptive routing and distributed control in communication networks*
- ◆ **Science and Technology in Japan individual post-doc fellowship [02/99 - 11/00]** - Awarded by the scientific institutions of the European Union for the research project: *Mobile stigmergetic agents for control of network systems*
- ◆ **Training and Mobility of Researchers (TMR) individual post-doc fellowship [02/99 - 08/99]** - Awarded by the scientific institutions of the European Union for the research project: *Multi-agent based techniques for distributed adaptive routing*
- ◆ **Training and Mobility of Researchers individual post-grad fellowship [08/96 - 02/99]** - Awarded by the scientific institutions of the European Union for the research project: *Autonomous reinforcement learning agents for Partially Observable Markov Decision environments*
- ◆ **Post-graduate individual fellowship for studies on artificial intelligence [01/94 - 12/94]** - Awarded by the municipality of Trento (Italy)
- ◆ **Post-graduate individual fellowship for studies on artificial intelligence [07/93 - 12/93]** - Awarded by the municipality of Trento (Italy)

7. Editorship and Professional Service

◆ Edited volumes:

- C. Di Chio, A. Brabazon, G.A. Di Caro, et al. (editors), *Proceedings of EvoApplications 2011: EvoCOMNET, EvoFIN, EvoHOT, EvoMUSART, EvoSTIM, and EvoTRANSLOG*, LNCS 6625, Springer, 2011
- M. Dorigo, M. Birattari, G.A. Di Caro, et al. (editors), *Swarm Intelligence, Proceedings of the 7th International Conference ANTS 2010*, LNCS 6234, Springer, 2010
- C. Di Chio, A. Brabazon, G.A. Di Caro, et al. (editors) *Proceedings of EvoApplications 2010: EvoCOMNET, EvoENVIRONMENT, EvoFIN, EvoMUSART, and EvoTRANSLOG*, LNCS 6025, Springer, 2010
- M. Giacobini, A. Brabazon, S. Cagnoni, G.A. Di Caro, et al. (editors). *Proc. of EvoWorkshops 2009: EvoCOMNET, EvoENVIRONMENT, EvoFIN, EvoGAMES, EvoHOT, EvoIASP, EvoINTERACTION, EvoMUSART, EvoNUM, EvoPhD, EvoSTOC, and EvoTRANSLOG*, LNCS 5484, Springer, 2009
- M. Giacobini, A. Brabazon, S. Cagnoni, G.A. Di Caro, et al. (editors). *Proc. of EvoWorkshops 2008: EvoCOMNET, EvoFIN, EvoHOT, EvoIASP, EvoMUSART, EvoNUM, EvoSTOC, and EvoTRANSLOG*, LNCS 4974, Springer, 2008.
- M. Giacobini, A. Brabazon, S. Cagnoni, G.A. Di Caro, et al. (editors). *Proc. of EvoWorkshops 2007: EvoCOMNET, EvoFIN, EvoIASP, EvoINTERACTION, EvoMUSART, EvoSTOC, and EvoTRANSLOG*, LNCS 4448, Springer, 2007.
- M. Dorigo, G.A. Di Caro, and M. Sampels (editors). *Ant Algorithms - Proc. of ANTS 2002, 3rd International Workshop on Ant Algorithms*, LNCS 2463, Springer, 2002.

◆ **Journal special issues:**

- M. Dorigo, M. Birattari, G.A. Di Caro, R.Doursat, A. Engelbrecht, L.M. Gambardella, R. Groß, E. Sahin, T. Stützle, Eds., “Special issue on ANTS 2010”, *Swarm Intelligence Journal*, Springer, 2011, vol. 5(3–4).
- M. Dorigo, G. A. Di Caro, T. Steutzle, Guest Eds. “Special Issue on Ant Algorithms”, *Future Generation Computer Systems (FGCS)*, Elsevier, Vol. 16, N. 8, 2000

◆ **Conference/Workshop chair:**

- G. A. Di Caro, M. Farooq and E. Tarantino, *EvoCOMNET: 8th European Event on the Application of Nature-inspired Techniques to Telecommunication Networks and other Parallel and Distributed Systems*, Turin, Italy, April 27–29, 2011.
- M. Dorigo, G.A. Di Caro, A. Engelbrecht, L. Gambardella and E. Sahin, *ANTS 2010, 7th International Conference on Swarm Intelligence*, Brussels, Belgium, September 8–10, 2010
- G. A. Di Caro, M. Farooq and E. Tarantino, *EvoCOMNET: 7th European Event on the Application of Nature-inspired Techniques to Telecommunication Networks and other Parallel and Distributed Systems*, Istanbul, Turkey, April 7–9, 2010.
- G. A. Di Caro, M. Farooq and E. Tarantino, *EvoCOMNET: 6th European Workshop on the Application of Nature-inspired Techniques to Telecommunication Networks and other Parallel and Distributed Systems*, Tübingen, Germany, April 15–17, 2009.
- G. A. Di Caro, F. Ducatelle, A. Forster, G. Venayagamoorthy, *5th IEEE Symposium on Swarm Intelligence, Special Session on: Swarm Intelligence for Wireless Ad Hoc Networks*, St. Louis, Missouri, USA, September 21–23, 2008.
- G. A. Di Caro and M. Farooq, *EvoCOMNET: 5th European Workshop on the Application of Nature-inspired Techniques to Telecommunication Networks and other Connected Systems*, Naples, Italy, March 26–28, 2008.
- G. A. Di Caro and M. Farooq, *EvoCOMNET: 4th European Workshop on the Application of Nature-inspired Techniques to Telecommunication Networks and other Connected Systems*, Valencia, Spain, April 11–13, 2007.
- M. Dorigo, G.A. Di Caro, N. Sampels, *ANTS’02, 3rd International Workshop on Ant Algorithms*, Brussels, Belgium, September 12–14, 2002.

◆ **Editorial boards:**

- *Swarm Intelligence Journal*, Springer-Verlag
- *Journal of Evolutionary Algorithms*, Institute of Advanced Scientific Research (I-ASR)

◆ **Journal reviewer:** IEEE Trans. on Systems, Man, and Cyb., Networks, Adaptive Behavior, IEEE Trans. on Evolutionary Comp., J. of Heuristics, Artificial Life, Swarm Intelligence J., Telecomm. Systems, European J. of Operational Research, J. of Networks, ACM Trans. on Internet Technology, J. of Systems Science, J. of System Architectures, J. of Computer Science, Computer Networks, ACM Trans. on Autonomous Adaptive Systems, Electronic and Telecomm. Research Institute J., Ad Hoc Networks, J. of Computational Intelligence and Applications, Sensors, European J. of Operations Research.

◆ **Conference reviewer:** PPSN V-VII, IEEE Swarm Intelligence Symposium 2005–2008, IEEE Int. Conf. on Communications 2007, Int. Conf. on Dependable Systems and Networks 2007, GECCO 2005–2010, Bio-ADIT, GP 1998, AAMAS 2004, ANTS 1998–2010.

8. Scientific Publications

8.1 Refereed Journal Articles

1. M. Dorigo, D. Floreano, L. M. Gambardella, F. Mondada, S. Nolfi, T. Baaboura, M. Birattari, M. Bonani, M. Brambilla, A. Brutschy, D. Burnier, A. Campo, A. L. Christensen, A. Decugnière, G. A. Di Caro, F. Ducatelle, E. Ferrante, A. Förster, J. Martinez Gonzales, J. Guzzi, V. Longchamp, S. Magnenat, N. Mathews, M. Montes de Oca, R. O’Grady, C. Pinciroli, G. Pini, P. Réturnaz, J. Roberts, V. Sperati, T. Stirling, A. Stranieri, T. Stützle, V. Trianni, E. Tuci, A. E. Turgut, and F. Vaussard. Swarmanoid: a novel concept for the study of heterogeneous robotic swarms. *IEEE Robotics & Automation Magazine*, 2012 (to appear).
2. F. Ducatelle, G.A. Di Caro, C. Pinciroli, and L. Gambardella. Self-organized cooperation between robotic swarms. *Swarm Intelligence Journal*, (5):73–96, 2011.
3. M. Saleem, G.A. Di Caro, , and M. Farooq. A review of swarm intelligence based routing protocols for wireless sensor networks. *Information Sciences*, 181(20):4597–4624, October 2011.
4. F. Ducatelle, G.A. Di Caro, and L. Gambardella. Principles and applications of swarm intelligence for adaptive routing in telecommunications networks. *Swarm Intelligence Journal*, 4(3):173–198, 2010.
5. G.A. Di Caro, S. Giordano, M. Kulig, D. Lenzarini, A. Puiatti, F. Schwitter, and S. Vanini. Deployable application layer solution for seamless mobility across heterogeneous networks. *Ad Hoc & Sensor Wireless Networks*, 4(1–2):1–42, 2007.
6. O. Babaoglu, G. Canright, A. Deutsch, G.A. Di Caro, F. Ducatelle, L.M. Gambardella, N. Ganguly, M. Jelasity, R. Montemanni, A. Montresor, and T. Urnes. Design patterns from biology for distributed computing. *ACM Transactions on Autonomous and Adaptive Systems (TAAS)*, 1(1), September 2006.
7. G.A. Di Caro, F. Ducatelle, L.M. Gambardella, and A. Rizzoli. Building blocks from biology for the design of algorithms for the management of modern dynamic networks. *European Research Consortium for Informatics and Mathematics (ERCIM) News*, Special Issue on Swarm Intelligence, 64, January 2006.
8. G.A. Di Caro, F. Ducatelle, and L.M. Gambardella. BISON: Biologically-inspired techniques for self-organization in dynamic networks. *Kuenstliche Intelligenz*, Special Issue on Swarm Intelligence, 4:36–39, November 2005.
9. F. Ducatelle, G.A. Di Caro, and L.M. Gambardella. Using ant agents to combine reactive and proactive strategies for routing in mobile ad hoc networks. *International Journal of Computational Intelligence and Applications*, Special Issue on Nature-Inspired Approaches to Networks and Telecommunications, 5(2):169–184, June 2005.
10. G.A. Di Caro, F. Ducatelle, and L.M. Gambardella. AntHocNet: an adaptive nature-inspired algorithm for routing in mobile ad hoc networks. *European Transactions on Telecommunications*, 16(5):443–455, 2005.
11. G.A. Di Caro and M. Dorigo. AntNet: Distributed stigmergetic control for communications networks. *Vivek, a Quarterly in Artificial Intelligence*, 12(3 & 4):2–37, 1999. Reprinted from JAIR.
12. M. Dorigo, G.A. Di Caro, and L. M. Gambardella. Ant algorithms for discrete optimization. *Artificial Life*, 5(2):137–172, 1999.
13. G.A. Di Caro and M. Dorigo. AntNet: Distributed stigmergetic control for communications networks. *Journal of Artificial Intelligence Research (JAIR)*, 9:317–365, 1998.
14. F. Valentiniotti, G.A. Di Caro, and B. Crespi. Real-time parallel computation of disparity and optical flow using phase difference. *Machine Vision and Applications*, 9(3):87–96, 1996.
15. R. Campanini, G.A. Di Caro, M. Villani, I. D’Antone, and G. Giusti. Parallel architectures and intrinsically parallel algorithms: Genetic algorithms. *International Journal of Modern Physics C*, 5(1):95–112, 1994.
16. R. Campanini, I. D’Antone, G.A. Di Caro, and G. Giusti. A transputer-based parallel expert diagnostic system. *Parallel Computing*, 19(6):685–692, 1993.

8.2 Book Chapters

1. G.A. Di Caro, F. Ducatelle, and L.M. Gambardella. Routage dans les réseaux mobiles ad hoc en environnement urbain (in French, "Routing in urban mobile ad hoc networks"). In N. Monmarché, F. Guinand, and P. Siarry, editors, *Fourmis artificielles 2, nouvelles directions pour une intelligence collective*. Hermès Science Publications, France, 2009.
2. G.A. Di Caro, F. Ducatelle, and L.M. Gambardella. Routing in urban mobile ad hoc networks (translated and reprinted from Hermès Science Publications). In N. Monmarché, F. Guinand, and P. Siarry, editors, *Artificial ants*, page 576. Wiley-ISTE, 2010.
3. M. Farooq and G.A. Di Caro. Routing protocols for next generation networks inspired by collective behaviors of insect societies: An overview. In C. Blum and D. Merckle, editors, *Swarm Intelligence: Introduction and Applications*, Natural Computing. Springer, 2008.
4. G.A. Di Caro, F. Ducatelle, and L.M. Gambardella. Theory and practice of Ant Colony Optimization for routing in dynamic telecommunications networks. In N. Sala and F. Orsucci, editors, *Reflecting interfaces: the complex coevolution of information technology ecosystems*, pages 185–216. Idea Group, Hershey, PA, USA, 2008.
5. M. Dorigo and G.A. Di Caro. The ant colony optimization meta-heuristic. In D. Corne, M. Dorigo, and F. Glover, editors, *New Ideas in Optimization*, pages 11–32. McGraw-Hill, 1999.

8.3 Refereed Conference Papers and Abstracts

1. F. Ducatelle, G. A. Di Caro, and L. Gambardella. Spatial awareness in robotic swarms through local wireless communications (Extended abstract). In *Proceedings of the 11th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Valencia, Spain, June 4–8, 2012 (to be published).
2. A. Giusti, J. Nagi, L. Gambardella, S. Bonardi, and G. A. Di Caro. Human-swarm interaction through distributed cooperative gesture recognition. In *Proceedings of the 7th ACM/IEEE International Conference on Human-Robot Interaction (HRI) (Video Session)*, Boston, MA, USA, March 5-8, 2012 (to be published).
3. N. E. Toklu, R. Montemanni, G. A. Di Caro, and L. M. Gambardella. A shared incumbent environment for the minimum power broadcasting problem in wireless networks. In *Proceedings of the International Conference on Information and Computer Networks (ICIN 2012)*, Singapore, February 26–28, 2012 (to be published). IACSIT Press, Singapore.
4. E. Feo Flushing, J. Nagi, and G.A. Di Caro. A mobility-assisted protocol for supervised learning of link quality estimates in wireless networks. In *Proceedings of the International Conference on Computing, Networking and Communications (ICNC), International Workshop on Mobility and Communication for Cooperation and Coordination (MC³)*, Maui Island, Hawaii, USA, January 30 – February 2, 2012 (to be published).
5. M. Salani, A. Giusti, G. A. Di Caro, A. Rizzoli, and L. M. Gambardella. Lexicographic multi-objective optimization for the unit commitment problem and economic dispatch in a microgrid. In *Proceedings of the 2nd IEEE PES (Power & Energy Society) European Conference on Innovative Smart Grid Technologies (ISGT-EUROPE)*, Manchester, UK, December 5–7, 2011.
6. M. Mojana, R. Montemanni, G. A. Di Caro, and L. M. Gambardella. An algorithm combining linear programming and an ant system for the sequential ordering problem. In *Proceedings of the Second Annual International Conference on Advanced Topics in Artificial Intelligence (ATAI)*, Singapore, November 24–25 2011. (BEST RESEARCH PAPER AWARD).
7. R. Montemanni, R. Mojana, G. A. Di Caro, and L. M. Gambardella. Matheuristic approach for the sequential ordering problem. *42nd Annual Conference of the Italian Operational Research Society (AIRO)*, Brescia, Italy, September 6–9, 2011.
8. G.A. Di Caro and E. Feo. Optimal relay node placement for throughput enhancement in wireless sensor networks. In *Proceedings of the 50th FITCE International Congress – ICT: bridging an ever shifting digital divide*, Palermo, Italy, August 31–September 3, 2011.

9. F. Ducatelle, G.A. Di Caro, C. Pinciroli, F. Mondada, and L. Gambardella. Communication assisted navigation in robotic swarms: self-organization and cooperation. In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, San Francisco, USA, September 25–30, 2011.
10. C. Pinciroli, V. Trianni, R. O’Grady, G. Pini, A. Brutschy, M. Brambilla, N. Mathews, E. Ferrante, G.A. Di Caro, F. Ducatelle, T. Stirling, A. Gutierrez, L. Gambardella, and M. Dorigo. ARGoS: a modular, multi-engine simulator for heterogeneous swarm robotics. In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, San Francisco, USA, September 25–30, 2011.
11. A. Reina, G.A. Di Caro, F. Ducatelle, and L. M. Gambardella. Distributed motion planning for ground objects using a network of robotic ceiling cameras. In *Proceedings of the 12th Conference Towards Autonomous Robotic Systems (TAROS)*, volume 6856 of *Springer LNAI*, pages 140–151, Sheffield, UK, August 31–September 2, 2011. (CONFERENCE BEST POSTER AWARD).
12. F. Ducatelle, G.A. Di Caro, A. Förster, and L. Gambardella. Mobile stigmergic markers for navigation in a heterogeneous robotic swarm. In M. Dorigo, M. Birattari, G.A. Di Caro, R. Doursat, A. Engelbrecht, D. Floreano, L. Gambardella, R. Groß, E. Sahin, H. Sayama, and T. Stützle, editors, *Swarm Intelligence, Proceedings of the 7th International ANTS Conference*, LNCS 6234. Springer, 2010.
13. F. Ducatelle, G.A. Di Caro, and L. M. Gambardella. Cooperative stigmergic navigation in a heterogeneous robotic swarm. In *Proceedings of the 11th International Conference on Simulation of Adaptive Behavior (SAB)*, Paris, France, August 24–28, 2010.
14. F. Ducatelle, G.A. Di Caro, and L. M. Gambardella. Cooperative self-organization in a heterogeneous swarm robotic system. In *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2010)*, Portland, Oregon, USA, July 7–11, 2010.
15. A. Reina, G.A. Di Caro, F. Ducatelle, and L. M. Gambardella. A distributed approach to holonomic path planning. In *Proceedings of the Workshop on Motion Planning: From Theory to Practice, Robotics: Science and Systems (RSS) conference*, Zaragoza, Spain, June 27, 2010.
16. F. Ducatelle, A. Förster, G.A. Di Caro, and L. M. Gambardella. Supporting navigation in multi-robot systems through delay tolerant network communication. In *Proceedings of the IFAC Workshop on Networked Robotics (NetRob)*, Golden, Colorado, USA, October 6–8, 2009.
17. F. Ducatelle, A. Förster, G.A. Di Caro, and L. M. Gambardella. New task allocation methods for robotic swarms. In *Proceedings of the 9th IEEE/RAS Conference on Autonomous Robot Systems and Competitions (ROBOTICA)*, Castelo Branco, Portugal, May 8–9, 2009.
18. G.A. Di Caro, F. Ducatelle, and L. M. Gambardella. Wireless communications for distributed navigation in robot swarms. In *Proceedings of the 6th European Workshop on the Application of Nature-inspired Techniques for Telecommunication Networks and other Parallel and Distributed Systems (EvoCOMNET)*, volume 5484 of *LNCS*, Tübingen, Germany, April 15–17 2009. Springer.
19. F. Ducatelle, G.A. Di Caro, and L. M. Gambardella. Robot navigation in a networked swarm. In *Proceedings of the International Conference on Intelligent Robotics and Applications (ICIRA)*, volume 5314 of *LNAI*, pages 275–285. Springer, 2008.
20. F. Ducatelle, G.A. Di Caro, and L. M. Gambardella. A new approach for integrating proactive and reactive routing in mobile ad hoc networks. In *Proceedings of the 5th IEEE International Conference on Mobile Ad Hoc and Sensor Systems (MASS)*, 2008.
21. F. Ducatelle, G.A. Di Caro, and L. M. Gambardella. An evaluation of two swarm intelligence manet routing algorithms in an urban environment. In *Proceedings of the 5th IEEE Swarm Intelligence Symposium (SIS)*, 2008.
22. G.A. Di Caro, F. Ducatelle, and L. M. Gambardella. A simulation study of routing performance in realistic urban scenarios for manets. In *Proceedings of ANTS 2008, 6th International Workshop on Ant Algorithms and Swarm Intelligence*, volume 4217 of *LNCS*. Springer, 2008.

23. F. Ducatelle, G.A. Di Caro, and L. M. Gambardella. An analysis of the different components of the AntHocNet routing algorithm. In *Proceedings of ANTS 2006, 6th International Workshop on Ant Algorithms and Swarm Intelligence*, volume 4150 of *LNCS*, pages 37–48. Springer, 2006.
24. G.A. Di Caro, L.M. Gambardella, and A. Rizzoli. Tracing and modeling human mobility. *IPLnet Workshop 2006*, Bellinzona, Switzerland, September 5–6, 2006.
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